

PUBLIC RADIATION SAFETY SIGNIFICANCE DETERMINATION PROCESS

This process is used in conjunction with Inspection Procedure 71122, Public Radiation Safety, to determine the risk significance of a finding.

Radioactive Effluent Release Program

This branch of the logic diagram focuses on the licensee's radioactive effluent release program. It assesses the licensee's ability to monitor and maintain radioactive effluents ALARA (i.e., the design dose objectives contained in Appendix I to 10 CFR Part 50). Being able to assess dose from radioactive effluents and maintain radiation doses to a member of the public within Appendix I design objectives is the success criterion.

The regulatory basis for requiring radiological effluent monitoring programs is given in General Design Criterion 60, "Control of releases of radioactive materials to the environment," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities." Criterion 60 requires a licensee to provide for a means to control the release of radioactive materials in gaseous and liquid effluents during normal reactor operation, including anticipated operational occurrences. An additional requirement is in Section IV.B.1 of Appendix I to 10 CFR Part 50. This section requires a licensee to provide data on the quantities of radioactive material released in liquid and gaseous effluents to assure that such releases are within the ALARA design objectives. This data, pursuant to 10 CFR 50.36a, is reported to the NRC annually.

SDP determination process: Is there a finding in the licensee's radiological effluent monitoring program that is contrary to NRC regulations or the licensee's Technical Specifications (TS), Offsite Dose Calculation Manual (ODCM), or procedures? If yes, was the licensee able to assess the dose from the release of radioactive effluent and what is the dose impact (as calculated by the licensee) of the event? If there was no radiological release associated with the event (no dose impact to a member of the public) then there is minimal "risk" and the SDP classifies it as GREEN. The licensee is responsible to resolve the finding. The NRC will periodically inspect the effectiveness of the licensee's corrective action program.

If the licensee failed to have any data in which to assess the dose (i.e., no monitor data, no independent sample data, no actual release sample data, etc.), then the finding would be WHITE. This would be a rare event. Usually the licensee has enough data from tank volumes and periodic sample analysis of the material in the tank to be able to reconstruct a source term and calculate a bounding dose from the unmonitored release.

If the event resulted in an effluent release of radioactive material that, based on the methodology in the licensee's ODCM, exceeded the dose values in Appendix I to 10 CFR Part 50 but is less than 0.1 rem, the SDP classifies the event as WHITE. In this case, the NRC will maintain some detail of oversight on the licensee's corrective actions. NOTE: The licensee has a Performance Indicator (PI) in this area that uses dose values equal to the quarterly dose values given in the TS or the ODCM. This SDP is not to be used to "double count" the PI. If a situation results in which the dose exceeds Appendix I values because of multiple effluent

releases which exceeded the PI threshold it should not automatically be assessed as a degraded cornerstone. The SDP is to be used to assess the significance of a finding on an action or event by the licensee which was contrary to NRC regulations, the licensee's TS, ODCM, or procedures.

If the event resulted in effluent release of radioactive material that, based on the methodology in the licensee's ODCM, exceeded the annual public dose limit in 10 CFR Part 20 of 0.1 rem but is less than 0.5 rem, the SDP classifies the event as YELLOW. There would be significant NRC oversight of the licensee's corrective actions.

If the event resulted in effluent release of radioactive material that, based on the methodology in the licensee's ODCM, exceeded 0.5 rem, the SDP classifies the event as RED. The NRC has lost confidence in the licensee's ability to control radioactive effluents. Significant NRC interaction with the licensee will result.

Example:

The licensee had an inoperable radiation monitor on the radioactive liquid effluent discharge line. Because the monitor was inoperable, the licensee was required to perform grab sample monitoring of the liquid discharge. The licensee failed to perform the sampling to verify that the liquid effluent was within the activity projected based on prior analysis of the hold-up tank. This is the finding. Looking at the SDP flowchart, the key decision to determine the significance of the finding are whether the licensee was able to assess the dose from the liquid effluent and what was the dose(i.e., below or above Appendix I). If the licensee was in a degraded condition for monitoring the release, but was still able to assess the dose, then the risk significance is GREEN. For the dose part of the risk assessment; was the calculated dose above or below the values in the decision diamonds? The dose determines the significance color.

Radioactive Environmental Monitoring Program

This branch of the logic diagram focuses on the licensee's ability to operate an effective radioactive environmental monitoring program.

The regulatory basis for requiring radiological environmental monitoring programs is given in General Design Criterion 64, "Monitoring Radioactivity Releases," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Licensing of Production and Utilization Facilities." Criterion 64 requires a licensee to provide for a means for monitoring the plant environs for radioactivity that may be released during normal operations, including anticipated operational occurrences, and from postulated accidents. An additional requirement is in Section IV.B.3 of Appendix I to 10 CFR Part 50. This section requires that the monitoring program identify changes in the use of unrestricted areas (e.g., for agricultural purposes) to permit modifications in the monitoring program for evaluating doses to individuals from principal pathways of exposure.

Radiological environmental monitoring is important both for normal operations, as well as in the event of an accident. During normal operations, environmental monitoring verifies the effectiveness of the plant systems used for controlling the release of radioactive effluents. It also is used to check that the levels of radioactive material in the environment do not exceed the projected values used to license the plant. For an accident, the program provides an additional means to estimate the dose to members of the public.

SDP determination process: Is there a finding in the licensee's radiological environmental monitoring program that is contrary to NRC regulations or the licensee's Technical Specifications (TS), Offsite Dose Calculation Manual (ODCM), or procedures? If yes, the question is; did it impair the licensee's ability to assess the impact of its radiological effluents on the environment? This means that a few of the environmental sampling stations were not operable or that not all the required environmental samples were collected or analyzed. Even though the licensee was missing data, an assessment of the environmental impact was still able to be done. For this case, the risk significance is GREEN.

The more significant finding is where the licensee failed to assess the environmental impact from its radioactive effluents. To answer the question with a yes means that the licensee's overall program is degraded. It does not mean that a few environmental samples over the course of a year were not taken, or improperly analyzed. A failure in one or two parts of the licensee's program is not sufficient to reach a WHITE significance determination. A failure to evaluate a required pathway (i.e., no valid data to be able to assess the environmental impact for that pathway) would result in a YES answer to the decision diamond and result in a WHITE risk significance finding. This is a high threshold to reach. Historically, inspection findings have documented that samples are missed, or a land use census was not performed, or the air samplers were broken for extended periods of time or they were not in the correct location. Overall, these findings have resulted in lost data, but not a complete failure to be able to assess the impact on the environment from that pathway, therefore a GREEN risk significance finding is typical for environmental monitoring programs.

Example 1:

The inspector observed the collection of air filters from an indicator air sampling station. The inspector discovered that over the previous 12 month period, one of the air sampler was found to be inoperable on 32 separate occasions. This meant that up to 32 weeks of air sample data was missing and/or suspect. Because the monitor was inoperable, the licensee is required to prepare and submit to the Commission, in the annual Radiological Environmental Operating Report, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. The licensee failed to prepare and submit the required report. This is the finding. Looking at the SDP flowchart, the key decision to determine the significance of the finding is whether or not the licensee was still able to assess the impact on the environment from radioactive gaseous effluents. In this case the licensee was able to correlate the valid air sample data with known gaseous effluent discharges. Also, the licensee had valid air sample data from the sectors on either side of the faulty air sampler. Therefore, the licensee had some valid data to use to assess the impact on the environment. Thus, for this case the significance determination is GREEN.

Example 2:

The inspector reviewed changes to the radiological environmental monitoring program put in place during the last year. The licensee, based on a review of historical data which showed that no radioactive material of plant origin was detected in any of the fish samples collected in the past 5 five years, eliminated the collection of fish in the river where the discharge canal empties. The inspector identified the this as an improper change to the environmental monitoring program because the change reduced the pathway monitoring to below the minimum level acceptable to the NRC. Guidance for the environmental monitoring program is given in the Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979. Regulatory Guide 4.1 provides a complete discussion of the program and changes to the program over time. The guidance in Regulatory Guide 4.1 allows the licensee to modify the program after 3 years of operational monitoring history if the it can be demonstrated from the levels in environmental media or calculations (using measured effluents and appropriate dispersion and bioaccumulation factors) that the doses and concentrations associated with a particular pathway are sufficiently small, the number of media sampled in the pathway and the frequency of sampling may be reduced. For this case, the licensee reduced the number of samples and the frequency to zero. Thus, the pathway was not monitored. The licensee failed to assess the environmental impact. The significance determination for this case is WHITE.

Radioactive Material Control Program

This branch of the logic diagram focuses on the licensee's radioactive material control program. It assesses the licensee's ability to prevent the inadvertent release of licensed radioactive material to an unrestricted area that can cause a radiation dose to members of the public. 10 CFR Part 20 contains the requirements for the control and disposal of licensed radioactive material. At a licensee's facility, any equipment or material that came into contact with licensed radioactive material or that had the potential to be contaminated with radioactive material of plant origin and are to be removed from the facility must be surveyed for the presence of licensed radioactive material. This is because NRC regulations, with one exception in 10 CFR 20.2005, provide no minimum level of licensed radioactive material that can be disposed of in a manner other than as radioactive waste or transferred to a licensed recipient.

It should be noted that discrete radioactive particles (also known as hot particles or fuel fleas) are not applicable to this program because the dose from discrete radioactive particles is not a total effective dose equivalent (TEDE) dose defined in 10 CFR Part 20. The dose from the particle is to a very small localized area of the skin and is not equivalent to the risk of a TEDE dose. However, while the skin dose from discrete radioactive particle is not evaluated in the SDP, it would still be counted as an occurrence.

SDP determination process: Is there an event or occurrence in the licensee's radiological material control program that is contrary to NRC regulations? If yes, the question is what is the dose impact (as calculated by the licensee) of the event? If the dose impact was not more than 0.005 rem total effective dose equivalent (TEDE) and there were not more than 5 of these events in the inspection period, then the SDP classification is GREEN. If the dose impact was greater than 0.005 mrem TEDE or there were more than 5 events that were not above 0.005 rem TEDE in the inspection period (may signify a programmatic breakdown), then the SDP classification is WHITE. If the dose impact is greater than 0.1 rem TEDE (exceeds 10 CFR Part 20 public dose limit), the SDP classification is YELLOW. If the dose impact was greater than 0.5 rem TEDE, the SDP classification is RED.

Historically, these events have had calculated doses well below 0.001 rem TEDE, thus, in most cases a GREEN significance determination is likely. However, if there were more than 5 events in the assessment period where licensed radioactive material was released, there is a potential for the cumulative dose from the occurrences to be 0.005 mrem TEDE or greater. This will result in a WHITE classification.

Example:

The inspector reviewed survey records of material released from the restricted area of the plant. The records indicated that materials with no detectable licensed radioactive material were released for unrestricted use. During the inspection the licensee receives a call from another nuclear power plant that had received painting equipment that was "free released" from the licensee. The radiation survey performed at that plant of the incoming painting equipment documented the presence of licensed radioactive material. The painting equipment was shipped directly from one plant to the other. The plant that received the contaminated painting equipment planned to return it to the first licensee (as a radioactive material shipment). The finding is that the licensee did not perform an adequate survey to prevent the inadvertent release of licensed radioactive material into an unrestricted area.

To determine the significance requires a determination of the dose consequence to an individual from handling or being near the contaminated equipment. The licensee is responsible to evaluate the potential radiological hazard from the equipment. The significance determination will be based on the calculated dose for the event.